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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Application Number: 10/623,330
Filing Date: July 18, 2003
Appellant(s): KESHAVMURTHY ET AL.

John G. Posa, Reg. No. 37,424
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 2 November 2006 appealing from the Office action mailed 24 May 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is incorrect. A correct statement of the status of the claims is as follows: Claim 16 instead of claim 18 has been cancelled in addition to claims 5, 6, 8 and 12-14 indicated as cancelled in the statement of the status of the claims.

This appeal involves claims 1-4, 7, 9-11, 15, and 17-22.

Claim 20 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 5, 6, 8, 12-14 and 16 been cancelled.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,856,842	REBELLO et al.	2-2005
6,463,349	WHITE et al.	10-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Rejections under 35 USC 102

Claims 1-4, 7, 17, 21 and 22 remain rejected under 35 U.S.C. 102(b) as being anticipated by USPN 5,398,193 to deAngelis.

As per claim 1, the deAngelis reference discloses an automated manufacturing method, comprising the steps of: receiving a description (see column 6 lines 24-25, "CAD/CAM representation") of an object to be fabricated ("prototype part") having a desired geometry (see column 4 line 41 and column 8 lines 32-35, "prespecified geometric tolerance"); identifying regions (see column 7

lines 41-46, "selected discrete areas of the discretized work surface") in which at least one automated material addition process (see column 7 lines 64-68, "materials additive processes") and at least one automated material subtraction process (see column 8 lines 7-12, "materials subtractive, extractive, or removal") should occur to fabricate the object ("prototype part") in accordance with the description ("CAD/CAM representation"); generating toolpaths (see column 7 lines 30-35, "geometric control" and column 8 lines 7-11, "commanded") associated with the material addition ("additive process") and subtraction processes ("subtractive processing"); and fabricating the object ("prototype part") in accordance with the toolpaths ("geometric control, commanded").

As per claim 2, the deAngelis reference discloses the regions ("selected discrete areas of the discretized work surface") are layers (see column 6 lines 25-27, "layers"), volumes, lines or voxels ("slices").

As per claim 3, the deAngelis reference discloses the automated material subtraction process ("materials subtractive, extractive, or removal") includes milling (see column 8 line 12, "milling") or the use of lasers (see column 8 line 11, "laser"), knives, hot wires, arc cutters, or plasmas cutters.

As per claim 4, the deAngelis reference discloses the automated material addition process ("materials additive processes") includes solid-state or fusion welding (see column 7 line 65, "power deposition and melting"), laser material deposition ("power deposition and melting"), metal spraying (see column 7 line 66, "plasma spraying"), or adhesive bonding.

As per claim 7, the deAngelis reference discloses further including the step of soft fixturing (see column 6 lines 46-51, "mask formation") multiple parts ("part layers").

As per claim 17, the deAngelis reference discloses further including the step of repairing (see column 8 lines 40-43, "complementary materials are deposited") an existing mold or other object ("empty regions of work surface").

As per claim 21, the deAngelis reference discloses certain features are deposited (see column 6 lines 63-66, "preformed masks") with excess stock ("gross contours") based on feature geometry (see column 6 lines 41-46, "desired geometry"); and removing material (see column 8 lines 7-11, "remove part and complementary materials") to enhance the deposition process (see column 7 lines 30-32, "materials additive"), or speed the build rate (see column 6 lines 50-51,

"reducing the amount of additive processing") of the object ("formation of the layer").

As per claim 22, the deAngelis reference discloses further including the step of generating a conformal support material containment structure (see column 6 lines 55-59, "mask contours").

Claims 1-4, 9-11, 15, 18 and 19 remain rejected under 35 U.S.C. 102(e) as being anticipated by USPN 6,856,842 B2 to Rebello et al.

As per claim 1, the Rebello et al. reference discloses an automated manufacturing method, comprising the steps of: receiving a description (see column 2 lines 33-41, "parametric model 70") of an object ("part 10") to be fabricated having a desired geometry ("geometry"); identifying regions ("holes, lines, curves, chamfers, blends, radii") in which at least one automated material addition process (see column 3 lines 4-9, "material addition") and at least one automated material subtraction process ("material removal") should occur to fabricate ("manufacturing") the object ("part 10") in accordance with the description ("parametric model 70"); generating toolpaths (see column 3 lines 9-10, "tool path generation") associated with the material addition ("material addition") and

subtraction processes ("material removal"); and fabricating ("manufacturing") the object ("part 10") in accordance with the toolpaths (see column 3 lines 40-42, "tool path").

As per claim 2, the Rebello et al. reference discloses the regions ("holes, lines, curves, chamfers, blends, radii") are layers, volumes, lines ("lines") or voxels.

As per claim 3, the Rebello et al. reference discloses the automated material subtraction process ("material removal") includes milling or the use of lasers (see column 3 lines 42-43, "lasers"), knives, hot wires, arc cutters ("cutters"), or plasmas cutters ("cutters").

As per claim 4, the Rebello et al. reference discloses the automated material addition process ("material addition") includes solid-state or fusion welding, laser material deposition (see column 3 lines 5-6, "deposition"), metal spraying (see column 3 lines 43-44, "laser cladding"), or adhesive bonding ("laser cladding").

As per claim 9, the Rebello et al. reference discloses further including the step of blending the regions (see column 3 lines 35-37, "continuity or other matching conditions") to eliminate seams ("adjuring tooling features") that would be generated due to the subtractive process ("material removal") used.

As per claim 10, the Rebello et al. reference discloses further including the step of creating enclosed (see column 3 lines 21-30, "airfoil 11") and overhanging features ("dovetail 12") using the additive ("material addition") or subtractive manufacturing processes ("material removal"), or a combination thereof.

As per claim 11, the Rebello et al. reference discloses further including the steps of: identifying changes (see column 2 lines 65-67, "changed") in the desired geometry ("underlying parametric model"); removing excess material ("context model ... change") to achieve the desired geometry ("underlying parametric model").

As per claim 15, the Rebello et al. reference discloses further including the step of generating enclosed cavities (see column 3 lines 21-24, "cavity tooling geometry") within the object ("blade 10") during the fabrication ("manufacturing") thereof.

As per claim 18, the Rebello et al. reference discloses a tool path (see column 3 lines 40-48, "tool path") associated with additive processing ("material addition") is based on the nature of the additive process ("material addition") used.

As per claim 19, the Rebello et al. reference discloses further including the step of incorporating negative draft angles (see figure 2, "dovetail 12") using the additive ("material addition") or subtractive processing ("material removal").

Claims 1-4, 7 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by USPN 6,463,349 B2 to White et al.

As per claim 1, the White et al. reference discloses an automated manufacturing method, comprising the steps of: receiving a description (see column 3 lines 45-46, "CAD descriptions") of an object ("objects") to be fabricated ("produced") having a desired geometry (see column 2 lines 26-28, "arbitrary shape"); identifying regions (see column 3 lines 47-48, "cross sections") in which at least one automated material addition process (see column 3 lines 36-37, "ultrasonically powered material addition subsystem") and at least one automated material subtraction process (see column 3 lines 38-39, "milling tool 33") should occur to fabricate the object (see column 2 lines 26-28, "fabrication of objects") in accordance with the description ("CAD descriptions"); generating tool paths (see column 3 lines 47-48, "generate path instructions") associated with the material addition ("material addition") and subtraction processes ("removal"); and fabricating the object ("fabrication of objects") in accordance with the tool paths ("path instructions").

As per claim 2, the White et al. reference discloses the regions ("cross sections") are layers (see column 4 lines 9-13, "foil layers, fiber layers"), volumes ("fiber volume"), lines or voxels ("fiber volume").

As per claim 3, the White et al. reference discloses the automated material subtraction process (see column 4 lines 46-47, "material removal unit") includes milling (see column 2 line 17-20, "drill/mill") or the use of lasers ("laser"), knives ("knife"), hot wires, arc cutters, or plasmas cutters.

As per claim 4, the White et al. reference discloses the automated material addition process (see column 4 line 43, "deposition head") includes solid-state or fusion welding (see column 3 line 59, "ultrasonic welding horn 58"), laser material deposition ("deposition head"), metal spraying, or adhesive bonding.

As per claim 7, the White et al. reference discloses further including the step of soft fixturing multiple parts (see column 4 lines 11-12, "foil layers consolidated around fiber layers").

As per claim 9, the White et al. reference discloses further including the step of blending the regions (see column 7 lines 6-12, "smooth surfaces") to eliminate seams ("each material application") that would be generated due to the subtractive process ("trimming operations") used.

(10) Response to Argument

Applicant's arguments, see pages 2-3 section 7A, filed 2 November 2006, with respect to the rejections of claim 9 under 35 USC 102(e) have been fully considered and are not persuasive.

In response to applicant's argument that the Rebello et al. reference fails to show "to eliminate seams that would be generated due to the subtractive process used", the Rebello et al. reference discloses applying tooling design rules that impose continuity or other matching conditions for adjoining tooling features (see column 3 lines 34-37). Toolpaths are included for manufacturing processes that include one or more machining or material addition steps. Examples of toolpaths include paths for cutters, lasers, and drills, as well as for solid free form fabrication (for example, laser cladding) and rapid prototyping (for example stereolithography and LOM) (see column 3 lines 40-45). Manufacturing steps include all types of manufacturing processes, for example forming steps, material addition steps (for example, deposition), material removal steps (for example machining, EDM or ECM), rapid prototyping steps (for example stereolithography), and finishing steps (for example, shot peening or laser peening) (see column 3 lines 4-9). Exemplary tooling features for blade 10 include airfoil tooling geometry (not

shown) for forming airfoil 11, a cavity tooling geometry for forming dovetail 12, and a platform tooling geometry for forming platform 13. The tooling features 132, in turn, may include tooling sub-features (also indicated by reference numeral 132 and generally referred to also as "tooling features" 132). For example, the airfoil tooling geometry may include pressure side and suction side tooling sub-features for forming pressure side 160 and suction side 161 of airfoil 11. Thus, manufacturing context model 136 prescribes the shape of the tooling features for each step in the manufacturing process. (See column 3 lines 20-32.)

The examiner interprets "impose continuity or other matching conditions for adjoining tooling features" as the step of "blending the regions to elimination of seams" taught by the present invention. It is inherent that seams, edges, or discontinuity would be generated due to a subtractive process involving material removal such as machining with cutters, lasers and drills.

Applicant's arguments, see page 3 section 7B, filed 2 November 2006, with respect to the rejections of claim 9 under 35 USC 102(e) have been fully considered and are not persuasive.

In response to applicant's argument that the White et al. reference fails to show "to eliminate seams that would be generated due to the subtractive process used", the White et al. reference discloses it may be desirable to conduct two trimming operations, where the first is a high-speed trimming operation, and the second is a contouring trim, designed to produce highly accurate and smooth surfaces on curved components, thereby eliminating the so-called stairstepping often found in additively manufactured components (see column 7 lines 6-12). A controller 38 receives CAD descriptions of objects to be produced and slices the files to produce cross sections of the object used to generate path instructions for both material addition and removal (see column 3 lines 45-48).

The examiner interprets "trimming operations designed to produce highly accurate and smooth surfaces on curved components" as the step of "blending the regions to elimination of seams" taught by the present invention.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Crystal J Barnes
CRYSTAL J. BARNES
PRIMARY PATENT EXAMINER
CJB
19 January 2007

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